

Final Fish and Wildlife Coordination Act Report
for the
Acequia de Chamita Rehabilitation Project
Rio Arriba County, New Mexico

U.S. Fish and Wildlife Service

June 1996



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PROJECT DESCRIPTION

The Acequia de Chamita is proposed for rehabilitation by the U.S. Army Corps of Engineers (Corps). This report is based on information provided to our office from the Corps April 15, 1996. The project is on the Rio Chama in Rio Arriba County, New Mexico, about 22 kilometers (km) northwest of Española, New Mexico (Figure 1). The diversion dam on the Rio Chama for the Acequia de Chamita is 2.1 km north of the community of Chamita and 19.2 km southeast of community of Ojo Caliente. Ditch work is proposed at six sites. Flow in the ditch would cease during project construction from about November to March. The recommended actions for this proposed project are:

Site 1. Regrade the first 384 meters (m) of the ditch below the diversion dam and install 1.1-m diameter pipe. The first 122 m would be standard polyvinyl-chloride (PVC) pipe. The remaining 262 m would be PVC pipe with perforations in the bottom half of the perimeter to allow seepage to maintain riparian vegetation.

Site 1a. Starting at 609 m from the diversion, a Parshall flume and gage would be installed.

Site 2. At 673 m from the diversion, a concrete headwall would be constructed in the existing alignment. Another 1.1-m diameter pipeline section would start at this point and extend to a location 1,037 m below the diversion.

Site 2a. A 57-m long siphon would be installed to replace a flume over the Arroyo Penita. This would be connected to a riser and pipe described under Site 2b.

Site 2b. A 1.1-m diameter PVC pipe would start at the downstream terminus of the riser described in 2a. This pipe section would extent to a point 1,397 m below the diversion.

Site 3. Starting at 1,578 m from the diversion, a flume over the Arroyo de la Presa would be rebuilt using existing concrete supports. The existing half-round corrugated metal pipe (CMP) would be replaced with a 1.1-m diameter CMP.

Site 4. A gate and sluice pipe would be added to an existing flume structure beginning at a point 2,125 m from the diversion.

EVALUATION METHODOLOGY

The project site was reconnoitered on 20 September 1994, by Craig L. Springer of the New Mexico Ecological Services Field Office (NMESFO) and Frank Graves of the Corps to discuss project features, construction methods, and areas of predicted impacts. A survey for southwestern willow flycatchers (*Empidonax traillii extimus*) (flycatcher) was

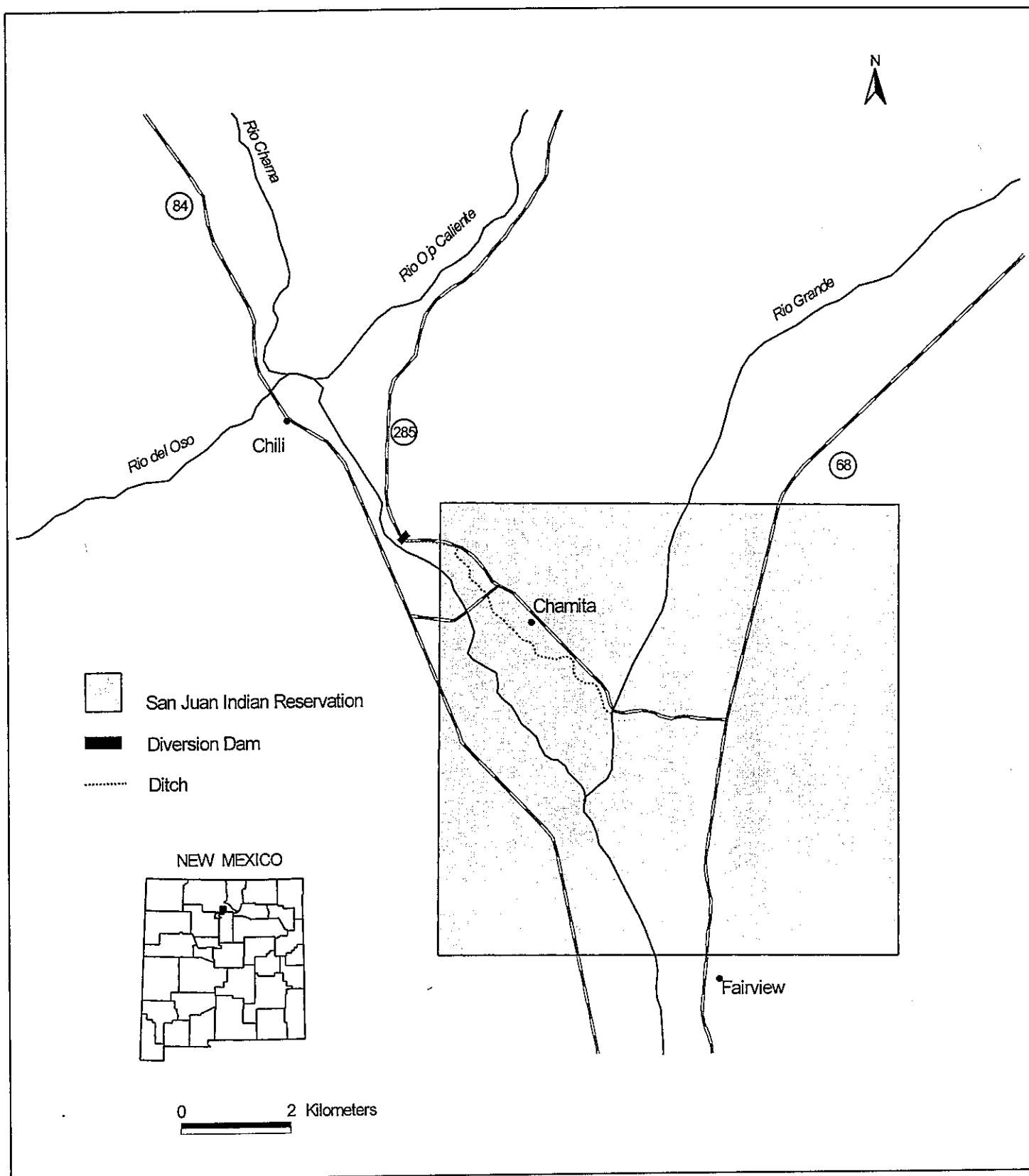


Figure 1. Location of Acequia de Chamita Rehabilitation Project, Rio Arriba County, New Mexico.

conducted on 11 June 1993, 14 June 1994 and 17 June 1995. Chamita Ditch was sampled for fish 1 September 1993. Vegetative components predicted to be impacted by project construction were enumerated 17 and 28 May 1993. Surveys to determine presence of bald eagles were conducted 21 December 1993 and 1 February 1994.

Additional biological data and background information were derived through review of relevant literature and personal communications. The Corps provided technical and background information on the project.

FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

Aquatic Resources

Native fishes found in the Rio Chama near the project area are Rio Grande chub, Rio Grande sucker, flathead chub, longnose dace, river carpsucker and fathead minnow. Introduced fish species that occur in the Rio Chama are brown trout, rainbow trout, white sucker, common carp and green sunfish (Platania 1991, Hanson 1992b).

Brown trout is the predominate game fish species in the Rio Chama. They feed on aquatic and terrestrial invertebrates (Sublette et al. 1990), but are also highly piscivorous (Becker 1983). Brown trout have a strong instinct to move upstream to find spawning habitat in autumn. They construct redds in riffles of a gravel-cobble association (Sublette et al. 1990), behavior initiated when water temperature decreases to about 9°C. This probably occurs at the project site in mid-November. Hanson (1992a, 1992b) identified the spawning and incubation season of brown trout as 15 October to 15 March.

White suckers typically inhabit small and large streams with a gravel to cobble substrates. They feed in flowing water on benthic invertebrates, algae, and organic detritus (Brown 1963, Eder and Carlson 1977). According to Sublette et al. (1990) white suckers have a low tolerance for heavy silt loads. White sucker spawn over unembedded, coarse substrates in riffles (Corbett and Powles 1986) where they adhere their eggs to the substrate (Twomey et al. 1984).

Green sunfish typically occupy lentic water or slow flowing areas in rivers and streams. They spawn throughout the summer in nests guarded by the male. Diet consists of aquatic and terrestrial insects, fish, crayfish and vegetable matter (Sublette et al. 1990).

Common carp occupy slow-flowing water of rivers. Aquatic vegetation is an important component of their habitat. Spawning occurs in spring with eggs adhered to aquatic plants. Common carp are omnivorous, feeding on algae, detritus, fish eggs and aquatic invertebrates (Sublette et al. 1990).

Longnose dace are common inhabitants of the Rio Chama. Habitat of this species consists of interstitial spaces routinely associated with unembedded gravel-cobble substrates, usually in riffles. They deposit eggs in naturally occurring depressions in riffles (Edwards et al. 1983) when the daily maximum temperature exceeds 15°C (Sublette et al. 1990). Longnose dace are demersal and feed on organisms found on the stream bottom such as chironomids and simuliids. They may also feed on plant material (Sublette et al. 1990).

In lotic water, the river carpsucker inhabits slow-velocity water. They spawn in spring through midsummer. Adhesive, demersal eggs are broadcast and receive no parental care. The river carpsucker is a detritivore but may also feed on aquatic invertebrates (Sublette et al. 1990).

The Rio Grande chub inhabits pools of small to moderate streams and are frequently associated with aquatic vegetation. They spawn in spring and early summer and are known to hybridize with longnose dace (Sublette et al. 1990).

The Rio Grande sucker inhabits small to large streams with a gravel cobble substrate. They spawn in the gravel areas in spring and sometimes in the fall. Food of this species consists of algae, diatoms, and benthic invertebrates (Sublette et al. 1990).

Terrestrial Resources

The project area is in a Conifer Mixed Woodland community type (Dick-Peddie 1993). Vegetation typical of riparian habitats along the Rio Chama and immediately adjacent to irrigation ditches include narrowleaf cottonwood, Fremont cottonwood, Siberian elm, coyote willow, and thinleaf alder. Sedges, cattails, and horsetail are found in hydric soil regimes along the edges of the stream. Irrigated pastures with grasses, orchards and gardens are found further away from the water course. Saltbush and rubber rabbitbrush are common in drier portions of the valley. Adjacent uplands are dominated by pinyon pine and one-seed juniper.

Big game mammals that may occur in the area are mule deer, and mountain lion. Furbearers such as the coyote, raccoon, beaver, long-tailed weasel, bobcat, swift fox, and striped skunk may be found in the project vicinity. Small game and nongame mammals typical of the area include the Nuttall's and desert cottontail, black-tailed jackrabbit, rock squirrel, Botta's pocket gopher, deer mouse, western harvest mouse, white-throated woodrat and American porcupine.

Wetland, riparian and pinyon-juniper habitats in the project area support a diverse assemblage of reptiles and amphibians. Amphibians common to one or more of these habitat types include the barred tiger salamander, Woodhouse's toad, red-spotted toad, and northern leopard frog. Reptiles typically found in these habitat types include the western collared lizard, mountain horned lizard, southern prairie lizard, variable skink, regal ringneck snake, desert striped whipsnake, smooth green snake, western diamondback rattlesnake, prairie rattlesnake, western blackneck garter snake, and wandering garter snake.

Riparian areas in New Mexico are heavily used by bird species (Hink and Ohmart 1984). Streams and wetlands in the project area may provide habitat, on a seasonal basis, for a variety of waterfowl including Canada goose, mallard, gadwall, green-winged teal, American widgeon, northern pintail, northern shoveler, ruddy duck, and common merganser. Shorebirds such as the American avocet and killdeer may occur in the project area. Upland game birds that may occur in the project area include the mourning dove, Merriam's turkey and scaled quail. Raptors typical of northern New Mexico mountains include the turkey vulture, golden eagle, northern harrier, sharp-shinned hawk, Cooper's hawk, red-tailed hawk, American kestrel, common barn-owl, and great horned owl.

Other nongame birds known from this area include the great blue heron, common nighthawk, belted kingfisher, northern flicker, downy woodpecker, hairy woodpecker, violet-green swallow, northern rough-winged swallow, cliff swallow, barn swallow, western scrub jay, pinyon jay, black-billed magpie, common raven, plain titmouse, white-breasted nuthatch, house wren, canyon wren, western bluebird, mountain bluebird, American robin, northern mockingbird, American pipit, American dipper, European starling, yellow warbler, spotted towhee, white-crowned sparrow, red-winged blackbird, Brewer's blackbird, Bullock's oriole, evening grosbeak and rock dove (Udvardy 1977, Scott 1987).

Endangered Species

The U.S. Fish and Wildlife Service (Service) has listed the southwestern willow flycatcher (*Empidonax traillii extimus*) (flycatcher) as endangered (USFWS 1995). The State of New Mexico lists the flycatcher as endangered (New Mexico Department of Game and Fish 1987). The range of the flycatcher in the United States includes southern California, extreme southern portions of Nevada and Utah, all of Arizona and New Mexico, west Texas, and extreme southwestern Colorado (Unitt 1987, Browning 1993). Although this range encompasses a large geographic area, the flycatcher's riparian nesting habitat has always been relatively rare in this predominantly arid region. The flycatcher can be a locally abundant, almost colonial species where extensive riparian habitat exists (Egbert 1981, Whitfield 1990). However, loss and modification of nesting habitat is the primary threat to this species (Phillips et al. 1964, Unitt 1987, USFWS 1993). Loss of habitat used during migration may also threaten the flycatcher's survival. Large scale losses of southwestern wetlands have occurred, particularly the cottonwood-willow riparian habitats of the flycatcher (Phillips et al. 1964, Carothers 1977, Rea 1983, Johnson and Haight 1984, Katibah 1984, Hubbard 1987, Johnson et al. 1987, Unitt 1987, General Accounting Office 1988, Bowler 1989, Szaro 1989, Dahl 1990, State of Arizona 1990, Howe and Knopf 1991).

The flycatcher is a riparian obligate and nests in thickets associated with streams and other wetlands where dense growth of willow, buttonbush, boxelder, Russian olive, tamarisk or other plants are present, often with a scattered overstory of cottonwood. Throughout the flycatcher's range, these riparian habitats tend to be rare, widely separated, small and/or linear locales, separated by vast expanses of arid lands. Flycatchers nest in thickets of trees and shrubs approximately two to seven m in

height or taller, with a densely vegetated understory from ground or water surface level to four m or more in height. Surface water or saturated soil is usually present beneath or next to occupied thickets (Phillips et al. 1964, Muiznieks et al. 1994). At some nest sites, surface water may be present early in the breeding season with only damp soil present by late June or early July (Muiznieks et al. 1994, Sferra et al. 1995). Habitats not selected for either nesting or singing are narrower or sparse riparian zones. These areas, however, may be used during migration.

Flycatchers begin arriving in New Mexico in late April and May (Sogge and Tibbitts 1992, Sogge et al. 1993, Sferra et al. 1995). Breeding begins in late spring, and young begin to fledge in early summer. Late nests and renests may not fledge young until late summer (Whitfield 1990, Sogge and Tibbitts 1992, Sogge et al. 1993).

Occupied and potential flycatcher nesting habitat exists along the Rio Chama and the Rio Grande. This habitat is primarily composed of riparian shrubs and trees, chiefly Goodding's willow and peachleaf willow, Rio Grande cottonwood, coyote willow and tamarisk.

The Rio Chama downstream of Abiquiu Dam is within the known or historic range of the other federally listed endangered or threatened species: the bald eagle, American peregrine falcon and whooping crane. Bald eagles frequent all major river systems in New Mexico from November through March. The favored prey of bald eagles are fish, waterfowl, and small mammals. Therefore, they prefer to roost in large trees near water. Potential roost sites along this reach of stream are large cottonwoods located on stream banks near where fish may be foraging at the water surface.

To determine impacts to eagles, surveys were conducted to document eagle use of the area. The New Mexico Department of Game and Fish censused eagles from an aircraft on 10 January 1994. Six eagles were observed along the Rio Chama from the Rio Grande upstream to Abiquiu Dam, a distance of 51.5 km. Shortly afterwards, the Corps flew a reconnaissance flight by helicopter on 20 January and located 3 eagles, 0.6 km upstream of Chamita Dam. During a float trip down the Rio Chama on 1 February 1994, five eagles were sighted at the following distance from Chamita Dam: one eagle at 2.6 km upstream, two eagles at 1.9 km upstream, one eagle 2.6 km downstream, and one eagle 2.9 km downstream. These surveys show bald eagles may use the project area.

The American peregrine falcon prefers areas with steep rocky cliffs close to water. Preferred habitats contain dense bird populations with large gulfs of air such as is in canyons. Most of the whooping cranes occurring in New Mexico, winter in the central part of the state from October through February. Individuals have wintered elsewhere but usually in association with sandhill cranes. Cranes typically roost in shallow water along gravel bars and islands in rivers or ponds. They feed in cultivated fields and wetlands within several miles of roost sites. The American peregrine falcon and the whooping crane are not residents in the project vicinity but may occur there as migrants.

The following species of concern may occur in the project area: New Mexican jumping mouse, spotted bat, loggerhead shrike and flathead chub. Species of concern are those for which further biological research and field study are needed to resolve their conservation status. These species have no legal status under the Endangered Species Act and are included in this document for planning purposes only. However, the Service would appreciate receiving any status information currently available or recently gathered concerning these species.

The habitat of the New Mexican jumping mouse consists of permanent, free-flowing streams in lowland valleys with vegetation consisting of a diverse assemblage of grasses, forbs, and sedges (Morrison 1992).

The spotted bat uses a variety of habitats from open scrub country to coniferous forests (Snow 1974, Watkins 1977). This species uses fissures in precipitous terrain at higher elevations. Juxtaposition of these sites to water holes where food may be found is apparently important (Snow 1974, Findley et al. 1975). Because this species is migratory, it may not be found in the project area during construction.

The loggerhead shrike is a year-round resident in the southern United States and migratory in the northern part of its range. This bird occurs in the continental United States, except the extreme northeast states, and into Canada (Scott 1987). The shrike feeds primarily on large insects; however, they will forage on small birds and mice when insects are not available (Udvardy 1977). Habitat for this bird is unforested areas in open country. Shrubs, trees, and perching sites are requirements for this species (Fraser and Luukkonen 1986). In the project area this shrike may be found in association with agriculture, grassland, and riparian fringe areas.

The flathead chub inhabits the Rio Chama and Rio Grande. Habitat for this species encompasses the main channels of large, turbid streams with moderate to strong currents. It can tolerate high levels of dissolved solids and uses substrates of mud, sand and rocks. Terrestrial insects are an important food although it is considered an omnivore. Spawning occurs when water levels recede to seasonal lows, with corresponding maximal temperatures, reduced turbidity (Sublette et al. 1990)

IMPACTS TO FISH AND WILDLIFE WITH THE PROJECT

The Corps provided the Service with information for only one alternative. Therefore, this section will evaluate only the potential impacts of the proposed alternative as previously described.

Aquatic Resources

Runoff from construction work sites, access routes, staging areas, and unprotected fills could degrade water quality in the irrigation ditch. Uncured concrete could increase alkalinity and conductivity, water quality factors to which coldwater biota are highly

sensitive. Accidental spills of fuels, lubricants, hydraulic fluids and other petrochemicals, although unlikely, would be harmful to aquatic life. Because water in the ditch will not be flowing, transport of contaminants down the ditch and into the Rio Chama is unlikely during construction. However, if contaminants are present, they may be transported to the river when ditch flow resumes.

Small fish may be swept into the ditch from the river and be entrained due to relatively high velocity of ditch flow. Larger fish may swim into the ditch and take up residence in the ditch if habitat is available. When ditch flow is shut off during the normal operation of the intake, these fish would die.

Terrestrial Resources

Short-term impacts to wildlife may occur from noise, dust and the presence of workers and machinery during project construction. Long-term adverse impacts may occur from the loss of riparian vegetation from construction of permanent structures, soil erosion, new access roads and compaction of soils.

Riparian vegetation predominates at Sites 1-3. Riparian vegetation is of high value to wildlife and includes vegetation near water as described in the previous section. The borrow and staging areas are comprised of grassland or agricultural fields. When avoidance is not possible, mitigation will be necessary. Wildlife habitat values are discussed in more detail in the Discussion section.

A small wetland occurs between the ditch and Rio Chama near Site 2. This habitat, combined with vegetation found near the Rio Chama, supports an abundance of wildlife, especially birds.

Endangered Species

The results of the combined eagle surveys indicate that eagles do not habitually roost or forage near Chamita Ditch, nor in and along the nearby Rio Chama. Therefore, it is unlikely the project would affect the species. However, if a bald eagle does use the area during the construction period, then human disturbance should be avoided.

The vegetation inventory along the ditch confirmed that habitat for the flycatcher is present. A 2,307 m² stand of willow exists at Site 1. This vegetative component is potential flycatcher habitat. Therefore, this listed species may be impacted by this project.

Since the loggerhead shrike would usually be found at the fringe of riparian areas in the project area, it is unlikely this project would affect this species. Disturbance is unlikely to the New Mexican jumping mouse (jumping mouse) since this species often migrates to upslope areas during colder weather. However, removal of riparian vegetation would be detrimental to the jumping mouse if present in the project area (Findley et al. 1975, Morrison 1992).

Habitat for the spotted bat may exist on the cliff wall northeast of the project area. However, the spotted bat will probably be absent from the area during fall when construction occurs.

DISCUSSION

Temporary impacts may occur to water quality due to removal of the existing structures and construction of new facilities. Erosion and runoff of silt-laden water into the stream or accidental discharges of uncured concrete, petrochemicals or other contaminants could degrade water quality. Containing and treating or removing wastewater from concrete batching, vehicle washdown, and aggregate processing could prevent impacts on water quality.

Limiting construction to periods of low stream flow or low precipitation, protecting temporary fills from erosion, and containing any runoff from construction sites would minimize negative impacts to aquatic organisms. Storing and dispensing fuels, lubricants, hydraulic fluids and other petrochemicals above the 100-year floodplain may also minimize negative impacts. Additional precautions should include:

- 1) prevent discharge of lubricants, hydraulic fluids or fuels,
- 2) contain and remove petrochemical spills and contaminated soil, and
- 3) dispose of these materials at an approved upland disposal site.

Permanent structures, construction access roads, staging, parking, refueling, and work areas may directly impact riparian habitats. Moist soils are particularly susceptible to impacts from heavy equipment. These work areas should be developed above the 100-year floodplain to decrease impacts. Long-term impacts can be avoided by limiting all permanent project features to the minimum area required, using existing access routes, and selecting less sensitive or previously disturbed areas for any new facilities. Unavoidable project impacts can be minimized by:

- 1) mowing rather than blading vegetation in construction areas,
- 2) minimizing the area of surface disturbing activities,
- 3) prohibiting off-road maneuvering.

Depositing of only clean, coarse and erosion-resistant fills in the water and employing silt curtains, settling basins or other suitable means would control turbidity. Reasonable precautions, such as pouring concrete in sealed forms should reduce the risk of accidental discharges into the river. Surplus concrete should be deposited outside the 100-year floodplain.

Streambank stability may be impacted by project construction at Site 1. Revegetation of backfills with indigenous plant species could prevent accelerated erosion on degraded stream banks. Only uncontaminated earth suitable for plant growth should be used.

To further reduce impacts, disturbed areas not required for permanent structures, or reserved for future project maintenance, should be revegetated. An appropriate

mixture of grasses, forbs and woody shrubs suitable to the site should be used. Compacted soils should be scarified prior to planting to promote water retention and seed germination. Revegetation will restore valuable wildlife habitat.

Construction projects that result in adverse impacts to fish and wildlife require the development of mitigation plans. These plans consider the value of fish and wildlife habitat affected. The Service has established a mitigation policy used as guidance in recommending mitigation (U.S. Fish and Wildlife Service 1981). The policy states that the degree of mitigation should correspond to the value and scarcity of the fish and wildlife habitat at risk. Four resource categories in decreasing order of importance are identified:

Resource Category No. 1 Habitats of high value for the species being evaluated that are unique and irreplaceable on a national basis or in the ecoregion section. No loss of existing habitat value should occur.

Resource Category No. 2 Habitats of high value that are relatively scarce or becoming scarce on a national basis or in the ecoregion section. No net loss of in-kind habitat value should occur.

Resource Category No. 3 Habitats of high to medium value that are relatively abundant on a national basis. No net loss of habitat value should occur and loss of in-kind habitat should be minimized.

Resource Category No. 4 Habitats of medium to low value. Loss of habitat value should be minimized.

The habitats in the immediate project area are classified as follows: Resource Category No. 2 - riparian vegetation (includes trees and shrubs such as willows). Resource Category No. 4 - grassland and agricultural fields.

Riparian habitats are classified in category 2 because they are scarce and disappearing at an astounding rate. About 90 percent of the historic wetland and riparian habitat in the southwest has been eliminated (Johnson and Jones 1977). Hink and Ohmart (1984) found a wetland decrease of 87 percent along the Rio Grande from 1918 to 1982. The mitigation goal for riparian areas, (trees and shrubs), in the project area is no net loss in wildlife value as a result of the proposed project.

Grassland and agricultural fields are considered category 4 because they are abundant in the southwest and are of relatively low value to wildlife. The mitigation goal for this category is to minimize impacts when possible.

Additional impacts include removal of 22 Siberian elm trees and one box elder greater than 12.5 centimeters (cm) diameter breast height (dbh) at Site 1. Three Russian olive, four cottonwood, four black locust and one Siberian elm greater than 12.5 cm dbh will be destroyed at Site 2. At Site 3, two cottonwood and one Siberian elm greater than 12.5 cm dbh will be removed.

Trees that are removed or destroyed due to construction can be replaced with poles or rooted nursery stock. Trees that are removed or destroyed due to construction should

be replaced with poles or rooted nursery stock at a ratio of 10:1. This results in a mitigation requirement of cottonwoods. This ratio is based on the understanding that the mature tree that is removed is much more valuable to wildlife than a planted seedling. In addition, it is unlikely that all the seedling will survive to become a large tree, therefore, this ratio serves to placate loss of seedlings. The resultant mitigation area should be 1.5 times larger than the area of removed vegetation or 0.5 hectares (ha). To prevent damage by beavers and other wildlife or livestock, the trees should be wrapped or enclosed with poultry wire or a suitable alternative.

Fish entrainment in acequias has been documented in Arizona (Roy 1988) and New Mexico. Nearly 78% of irrigation ditches surveyed for fish in the Embudo Creek watershed in New Mexico contained adult and sub-adult fish. The sampling method was not effective for larval fishes (Springer 1995). Fish were sampled in ten irrigation ditches on the Pecos River by NMESFO personnel in 1993 and 1994. Chamita Ditch was also sampled for fish in 1993. Larval and juvenile fishes are likely to become entrained in irrigation ditches, especially if a substantial portion of stream flow is diverted into the ditch. The New Mexico Department of Game and Fish Regulation Number 677 states, "The Director (of the Department) may require that a screen, paddle wheel, or other device to prevent passage of fish into ditches be installed by the owner of any canal or ditch into which waters containing protected fish are diverted. The Director may also require that the owner maintain the device during periods when waters are being diverted."

Significant losses of fish can occur by stranding or entrainment in ditches and irrigated fields. Designing the upstream channel to change distributional patterns of velocity near the ditch inlet could reduce the number of fish entering the ditch, except of course when the entire flow is diverted. Proper orientation of the irrigation heading structure to stream flow vectors could be important in reducing the vulnerability of small fish to being swept into ditches. If ditch headings are oriented at an acute angle to flow, as opposed to head-on, the interception rate of drifting fish could be reduced. Aligning ditch intakes parallel to flow would likely achieve this desired effect with the greatest efficacy. An ancillary benefit to the acequia organization would be a reduced need for maintenance, as woody debris would be less likely to accumulate at the intake.

An excellent fish exclusion measure would be fish screens. Fish screens have been designed in other parts of the country to prevent fish entry into ditches. McKay (1987) designed a self-cleaning portable fish screen to operate in flows of less than 0.14 cms. The Washington Department of Game and Fish has branch operations dedicated to the development of fish screens. That office has had success in protecting downstream migrating salmonids with a rotating drum screen. It is plausible that an inexpensive, self-cleaning screen could be installed at irrigation headings in New Mexico. A fish screen expert should be consulted during the design phase of future acequia projects.

To mitigate for the loss of riparian habitat, a small wetland could be created in the floodplain. Wetlands support a unique group of wildlife that are very scarce in the American Southwest; therefore, it is desirable to create this habitat. Because of the importance of this wildlife, a wetland of smaller size than would be required using trees

as mitigation would be adequate. A wetland 0.5 ha could be created immediately adjacent to the existing wetlands along the ditch or at other locations approved by the Service.

Another mitigation alternative would be to purchase flycatcher habitat where the species has been confirmed to exist. The flycatcher habitat immediately upstream of the project area would be a candidate site.

Given that perforated pipe will be installed in Site 1 to mitigate the potential loss of riparian vegetation, the Corps should monitor the efficacy of this experimental procedure. If the procedure is successful, this mitigation method may be employed in future acequia rehabilitation projects.

The vegetation that is trimmed or removed could be placed in piles to create habitat for small furbearers and birds. Brush piles could provide cover for nesting, escape from predators and protection from weather. They should be conical in shape, about 2-6 m at the base and 2 m in height (Giles 1978).

An investigation of human disturbance to bald eagles (Vian 1971) indicated that 50 percent of the eagles studied could not tolerate human activities within 150 m. Consequently, if an eagle is present within 150 m of the construction site, work should not commence until the eagle has left. However, if an eagle is beyond that distance, construction need not be interrupted. The proposed project construction will occur near the Rio Chama at the upstream end, but will be further removed from the view further downstream. The irrigation ditch rehabilitation is immediately adjacent to a paved highway in the upstream areas. We doubt that construction would be more disturbing than normal highway traffic. However, to prevent possible disturbance to bald eagles, construction should not occur if a bald eagle is within 150 meters of the ditch construction prior to construction beginning anytime. If a bald eagle lands near the construction site during construction activities, then construction can continue as this demonstrates that a significant perturbation is not occurring. The riparian vegetation in the project area may attenuate human perturbations. Consequently, if the project construction site is more than 150 meters away from the river's edge, then bald eagle disturbance should be very minimal, and construction activities could occur.

Since the project description does not contain adequate detail to evaluate all the impacts to fish and wildlife, and it is often difficult to precisely predict impacts, a follow-up inspection should be conducted by the Service. This could include an evaluation of fish and wildlife habitat changes in the project area by evaluating revegetation measures, and evaluating changes in hydrology caused by project construction. Additional mitigation may be required if impacts occurred that were not predicted or mitigation measures were not successful. Monitoring would also provide valuable information for future mitigation recommendations.

RECOMMENDATIONS

To prevent and reduce project impacts on fish and wildlife resources, the Service recommends the following measures be incorporated into the project design:

1. The Corps should comply with State water quality standards. This should include water quality monitoring.
2. Dewater construction work areas and contain and treat or remove wastewater from concrete batching, vehicle washdown, and aggregate processing.
3. Create brush piles from trimmed and removed vegetation.
4. Store and dispense all fuels, lubricants, hydraulic fluids and other petrochemicals above the 100-year floodplain. Inspect all equipment daily to ensure there are no leaks or discharges of lubricants, hydraulic fluids or fuels. Contain and remove any petrochemical spills, including contaminated soil, and dispose of these materials at an approved upland disposal site.
5. Develop staging, parking, storage and refueling areas above the 100-year floodplain.
6. Use existing roads and right-of-ways to the greatest extent practicable to transport equipment and construction materials to the project site. Prohibit vehicles from turning around or maneuvering except in designated areas.
7. Place only clean, coarse and erosion-resistant fills in the water and employ silt curtains, settling basins or other suitable means to control turbidity resulting from borrow and staging areas.
8. Contain any poured concrete in sealed forms and/or behind coffer dams to prevent discharge into the river. Place no surplus concrete within the 100-year floodplain.
9. Use only uncontaminated earth or alluvium suitable for revegetation with indigenous plant species for backfills.
10. Scarify compacted soils or replace topsoil and revegetate all disturbed sites with a suitable mixture of grasses and forbs.
11. The Corps should consult the Service if bald eagles frequent nearby roosts.

To mitigate project impacts on fish and wildlife resources, the Service recommends the following measures be incorporated into the project design:

1. Purchase perpetual conservation easement of extant flycatcher habitat.
2. Install fish exclusion device on heading structures.
3. The completed project should be inspected by the Service, at the Corps' expense, to evaluate impacts to fish and wildlife.
4. Plant and establish 370 cottonwood poles on 0.5 ha, or alternative plan approved by the Service.
5. Monitor efficacy of perforated pipe in the establishment of riparian vegetation.

Strict oversight and enforcement of all specifications are essential to ensure full and adequate mitigation of project impacts.

We are available to assist you in developing mitigation and monitoring plans for this project. Please refer any questions or comments you may have concerning this report to Mr. Craig L. Springer at (505) 761-4525.

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